

REMARKS

Claims 1-4, 6, 7 and 9-12 are pending in the present application. By this amendment, claim 11 is amended. Claims 5, 8 and 13-24 were canceled in a previous Amendment. Claim 1 is independent. No new matter is involved.

Reconsideration of this application, as amended, is respectfully requested.

Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 9 and 11 stand rejected under 35 U.S.C. § 112, second paragraph, as indefinite. This rejection is respectfully traversed.

With respect to claim 9, the language "various layers" was changed to - - a plurality of layers - - in the Amendment filed on July 13, 2006, to remove the antecedent basis problem.

With respect to claim 11, the language "includes one or more of" has been changed to - - is selected from the group consisting of - - to obviate the problem.

Applicant respectfully submits that the claim amendments discussed above overcome the grounds for this rejection.

Reconsideration and withdrawal of this rejection of claims 9 and 11 are respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 1, 2, 4 and 9-12 stand rejected under 35 USC §102(b) as being unpatentable over DE 3838598 A1. This rejection is respectfully traversed.

During patent examination the PTO bears the initial burden of presenting a *prima facie* case of unpatentability. In *re* Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); In *re* Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). This burden can be satisfied when the PTO presents evidence, by means of some teaching, suggestion or inference either in the applied prior art or generally available knowledge, that would have appeared to have suggested the claimed subject matter to a person of ordinary skill in the art or would have motivated a person of ordinary skill in the art to combine the applied references in the proposed manner to arrive at the claimed invention. See Carella v. Starlight Archery Pro Line Co., 804 F.2d 135, 140, 231 USPQ 644, 647 (Fed. Cir. 1986); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); In re Rinehart, 531 F.2d 1048, 1051-1052, 189 USPQ 143, 147 (CCPA 1976).

Because the rejection is based on 35 U.S.C. §103, what is in issue in such a rejection is "the invention as a whole," not just a few features of the claimed invention. Under 35 U.S.C. §103, "[a] patent may not be obtained . . . if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." The determination under §103 is whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. See In re O'Farrell, 853 F.2d 894, 902, 7 USPQ2d 1673, 1680 (Fed. Cir. 1988). In determining obviousness, the invention must be considered as a whole and the claims must be considered in their entirety. See Medtronic, Inc. v. Cardiac Pacemakers, Inc., 721 F.2d 1563, 1567, 220 USPQ 97, 101 (Fed. Cir. 1983).

In rejecting claims under 35 U.S.C. § 103, it is incumbent on the Examiner to establish a factual basis to support the legal conclusion of obviousness. See, In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one of ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal Inc. v. F-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the Examiner are an essential part of complying with the burden of presenting a *prima facie* case of obviousness. Note, In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be suggested or taught by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1970). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

A showing of a suggestion, teaching, or motivation to combine the prior art references is an “essential evidentiary component of an obviousness holding.” C.R. Bard, Inc. v. M3 Sys. Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232(Fed. Cir. 1998). This showing must be clear and particular, and broad conclusory statements about the teaching of multiple references, standing alone, are not “evidence.” See In re Dembiczak, 175 F.3d 994 at 1000, 50 USPQ2d 1614 at 1617 (Fed. Cir. 1999).

Moreover, it is well settled that the Office must provide objective evidence of the basis used in a prior art rejection. A factual inquiry whether to modify a reference must be based on objective evidence of record, not merely conclusory statements of the Examiner. See, In re Lee, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002).

Furthermore, during patent examination, the PTO bears the initial burden of presenting a *prima facie* case of unpatentability. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). If the PTO fails to meet this burden, then the Applicant is entitled to the patent. Only when a *prima facie* case is made, the burden shifts to the applicant to come forward to rebut such a case.

Claim 1 positively recites a combination of features that is neither disclosed in, nor suggested by, DE 3838598 A1. For example, claim 1, as amended, recites a combination of features including applying a glassy dielectric layer upon at least one surface of said substrate, the composition and layer thickness of which are selected according to its temperature coefficients and Young’s modulus to substantially prevent bending of the substrate after it has cooled to ambient temperature; firing said glassy dielectric layer in an oxidizing atmosphere; and forming at least one element of said thick-film circuit upon said dielectric layer; wherein the composition and layer thickness of the at

least one element is selected according to its temperature coefficient and Young's modulus to substantially prevent bending of the substrate after it has cooled to ambient temperature. DE 3838598 A1 does not explicitly disclose these positively recited features, not does it disclose them inherently, i.e., necessarily, as required by case law.

The Office Action admits that DE 3838598 A1 does not disclose the claimed invention but indicates that it does choose processing parameters to achieve the desired result, which is all that is necessary to meet the claimed limitations. The Office Action contends that Zimmermann chooses processing parameters to achieve the desired result being a final product that does not suffer from distortion/bending or warping, which the Examiner says is all that is necessary to meet the limitations recited in the claims. The rejection is premised on the speculation that the drawings in Zimmermann allegedly show a final product that does not suffer from distortion/bending or warping.

Applicant respectfully disagrees with this statement. The claimed invention positively recites a combination of features which are not even contemplated by DE 3838598 A1, and are not disclosed, either explicitly or inherently (necessarily). Further, the Office Action never provides any objective factual evidence that (1) one of ordinary skill in the art would be properly motivated to modify DE 3838598 A1 to arrive at the claimed invention, without any disclosure of the claimed process steps, or (2) how one would go about substantially preventing bending of the substrate after it has cooled to ambient temperature.

This rejection is based primarily on unwarranted speculation as to what DE 3838598A1 discloses and, as such, is improper.

Moreover the statement that that the drawings in Zimmermann allegedly show a final product that does not suffer from distortion/bending or warping is somewhat contradicted by the admission

in the office Action that the specification of Zimmermann does not recite or even suggest this phenomenon as occurring.

Applicant respectfully submits that the Office Action fails to make out a *prima facie* case of inherent disclosure in DE 383598A1 for a number of reasons.

Firstly, a claim limitation is inherent in the prior art if it is necessarily present in the prior art, not merely probably or possibly present. Rosco v. Mirro Lite, 304 F.3d 1373, 1380, 64 USPQ2d 1676 (Fed. Cir. 2002). The dispositive question regarding anticipation is whether one skilled in the art would reasonably understand or infer from the prior reference's teaching that every claim feature or limitation was disclosed in that single reference, Dayco Products, Inc. v. Total Containment, Inc., 329 F.3d 1358, 1368, 66 USPQ2d 1801 (Fed. Cir. 2003).

Moreover, the Applicant has examined the drawings provided by Zimmermann but does not agree with the Examiner that they necessarily depict a final product that does not suffer from distortion/bending or warping. Figures 1 and 2 of Zimmermann are close up sectional views that are drawn on a highly magnified scale, at which scale bending and/or warping would not be evident. To illustrate this point the Applicant has prepared samples of a substrate that has undergone warping or bending. The samples, marked specimens A, B, C and D, are being filed as a single attachment to this Amendment in a plastic bag with a sealing strip and with a label indicating the Application No., the Attorney's Docket Number, filing date, this law firm's name and address, and a legend indicating that the contents are Specimens A, B, C and D, as recommended in MPEP §608.03(a), entitled, "Handling of Models, Exhibits and Specimens." Specimen A comprises a titanium blank substrate (3 up size), specimen B comprises a titanium completed substrate with one glass (sacrificial) layer on the back, seven separately fired glass layers on the front, two separately fired conductor layers on

the front and many resistor, thermistor and strain element ink prints with one firing process on the front. Specimens C and D comprise titanium bent substrates that are only partially coated. After four separately fired front glass layers the bending is too great to allow further printing. For each of the additional 6 firing processes to follow there would be additional bending as the root cause of the bending is the oxide layer on the back (and its different expansion coefficient from the titanium) rather than any different expansion coefficients between the glass layers and the titanium. Examination of the specimens reveals a maximum deflection or bending of the metal substrate of approximately $\frac{1}{4}$ inch over the full length of the substrate. As the substrate is approximately 3 inches long, this translates to a maximum bending gradient of approximately 1 in 6. Figures 1 and 2 of the drawings in cited DE 3838598 depict a cross-sectional view of a thick film electronic circuit on a metal substrate 1. The dimensions of the circuit are not indicated in the document. However, having regard to circuits of this kind the horizontal dimension of the drawings in Figures 1 and 2 is unlikely to exceed 0.3mm. The scale of the drawings in Zimmermann is such that the degree of bending or warping is unlikely to be evident.

This may be seen by examining the two specimens C and D on a scale similar to Zimmermann. This is equivalent to viewing the specimens through a narrow slit that is at most 0.3mm wide. Even if such a narrow slit was placed over the specimens at a point of maximum bending gradient, the bending or warping (clearly evident in specimens C and D) would not be visible in such a narrow view. Thus substrate bending that is sufficient to prevent further printing could not be seen on the drawings shown. In any event the drawings in Zimmermann appear to be quite stylized or idealized as is common with diagrammatic cross-sections of integrated circuits and similar products in order to make the layer structure more clear. In this regard it should also be kept

in mind that the principal purpose of the drawings in Zimmermann is to show the relationship between a metallic substrate (1) and the various layers that are applied to the substrate in the disclosed process for manufacturing a thick-film electronic circuit. The fact that the drawings in Zimmermann do not show bending can be interpreted in one of two ways. Either Zimmermann did not consider bending to be an issue and has not addressed this problem, or alternatively, Zimmermann solved the bending problem but did not consider to disclose it in his text. In either event there appears to be little evidence that Zimmermann has "achieved" the desired result, being a final product that does not suffer from distortion/bending or warping.

Thus, the Office Action fails to make out a *prima facie* case of obviousness of claims 1, 2, 4 and 9-12 by DE 3838598 A1.

Reconsideration and withdrawal of this rejection are respectfully requested.
respectfully requested.

Claim 3 stands rejected under 35 USC §103(a) as unpatentable over DE 3838598 A1 in view of U.S. patent 6,551,720 to Sreeram et al. ("Sreeram"). This rejection is respectfully traversed.

Claim 3 recites a combination of features including wherein the glassy layer includes lead content and the step of diffusing lead content in the glassy layer through titanium oxides to enhance sufficiency of the bond between the substrate and the adjacent dielectric layer.

DE 3838598 A1 does not disclose this combination of features, nor does Sreeram which provides a separate lead glaze between a glassy-dielectric layer which can include lead, to provide good locking of the titanium metal substrate to the glass-ceramic composition.

The Office Action asserts that lead diffusing into the titanium glaze would take place

inherently and asks the Applicant to provide evidence to rebut this position.

Unfortunately, this is putting the cart before the horse. As explained by the case law cited above, the burden is on the Office to make out a *prima facie* case of inherent disclosure and may not be shifted to Applicant.

No *prima facie* inherency case has been made out by the office because there is no indication in DE 3838598 A1 that its green tape includes lead. Nor does the Office Action even address the issue of motivation to modify DE 3838598 A1 in view of Sreereram. Nor has the Office Action provided objective factual evidence that one of ordinary skill in the art would turn to Sreereram to modify DE 3838598 A1 to include lead which is what is recited. Sreereram does not teach modifying the green tape composition to include lead. Instead, Sreereram uses a separate lead glaze between the green tape and the titanium metal substrate, which is not what is claimed.

So, even if one of ordinary skill in the art were motivated to modify DE 3838598 A1 in view of Sreerer, the resulting modification would neither meet nor render obvious the claimed invention.

In response to this previously presented argument, the Office Action states that Sreeram provides motivation “as the lead glaze reduces oxidation of the titanium and allows good mechanical locking of the titanium to the glass ceramic composition in the firing process (col. 11, lines 20-35).”

Unfortunately, this rebuttal argument fails to address the fundamental shortcoming of the rejection, i.e., the continued failure of the Office to provide objective factual evidence that diffusing of lead into the titanium substrate not just possibly takes place, and not just probably takes place, but necessarily takes place, as is the standard required to make out a *prima facie* case of inherent disclosure.

Applicant also notes that a further difference between Zimmermann and the present invention is the feature wherein the present invention applies a glassy dielectric layer upon a surface of the titanium or titanium-alloy substrate and then fires in an oxidizing atmosphere the glassy dielectric layer that is in contact with the substrate. Zimmermann does not do this. Zimmermann fires in an inert atmosphere the insulating layer that is in contact with the metal substrate. Zimmermann fires a second insulating layer in an oxidizing atmosphere (room air) but that second layer is not in contact with the titanium substrate. The significance of this difference is the present invention aims to promote oxidation of the upper surface of the substrate to some extent by firing in an oxidizing atmosphere in order to promote a strong bond (with lead diffusion). In contrast Zimmermann inhibits such oxidizing of the upper surface of the substrate by firing the first layer in an inert atmosphere. This difference underscores the speculative nature of the Examiner's assertion that lead diffusion is inherently disclosed (i.e., necessarily occurs) in Zimmerman.

Thus, the Office Action fails to make out a *prima facie* case of obviousness of claim 3.

Reconsideration and withdrawal of this rejection are respectfully requested.

Claims 6-8 stand rejected under 35 USC §103(a) as unpatentable over DE 3838598 A1 in view of U.S. Patent 2,959,503 to Lindson.

Initially, Applicant respectfully submits that DE 3838598 A1 neither discloses nor suggests the invention recited in claims 6-8 at least because of the shortcomings of DE 3838598 A1 discussed above.

Moreover, Lindson is not applied to remedy the discussed shortcomings of DE 3838598 A1, so even if one of ordinary skill in the art were properly motivated to modify DE 3838598 A1, as suggested, that modification would neither meet nor render obvious the claimed invention.

Furthermore, as noted above, a showing of a suggestion, teaching, or motivation to combine the prior art references is an "essential evidentiary component of an obviousness holding." C.R. Bard, Inc. v. M3 Sys. Inc., 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232(Fed. Cir. 1998). This showing must be clear and particular, and broad conclusory statements about the teaching of multiple references, standing alone, are not "evidence." See In re Dembiczak, 175 F.3d 994 at 1000, 50 USPQ2d 1614 at 1617 (Fed. Cir. 1999). Applicant respectfully submits that this broad conclusory teaching of Lindson about coating titanium with a glass coating to prevent oxidation is not clear and particular enough to provide it on a reverse side of the substrate.

Thus, the Office Action fails to make out a *prima facie* case of obviousness of claims 6-8.

Reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Paul C. Lewis, Registration No. 43,368 at (703) 205-8000 in the Washington, D.C. area.

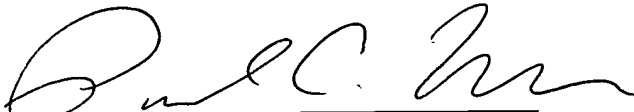
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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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PCL/RJW:mmi 
0044-0251P

Attachments: Specimens A, B, C and D in a single plastic bag - labeled per MPEP §608.03(a)